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ABSTRACT

CMS (Computer Mail System) School-Net is an informal, grass-roots telecommunications network developed by the San Diego (California) School District to provide assistance in improving student language and communications skills. Each CMS electronic bulletin board represents a node in the network, which operates independently during the day as a fairly normal-looking electronic bulletin board program. However, two features make it unique among electronic bulletin boards: it allows students to send lengthy files to their correspondents, and, in the middle of the night, all of the CMS nodes in the network dial each other up and exchange e-mail, permitting a teacher in San Diego to send a batch of student writing to a teacher in any of 25 or 30 other places. The primary function of the network is to transmit student writing from one place to another, thereby providing real audiences and real purposes to motivate student writing. This paper includes suggestions for creating a CMS School-Net as well as technical details of the system and descriptions of several projects that have been completed on the San Diego CMS School-Net. An editor's update notes that the network is expanding, despite threatened budget cutbacks and budget restrictions that have forestalled program evaluations. (EW)

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CMS School-Net

A Practical Approach to Effective School Networking

Al Rogers

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A Tool in Search of a Task

Telecommunications in the classroom for the most part has failed to be an effective tool for instruction and the development of basic skills. It has more often been a theoretical, impractical, difficult, expensive, or irrelevant activity, often done as a "computer literacy" activity. Thousands of teachers across the country *own* modems; far fewer of them *use* modems. Probably the best that can be said of telecommunications in a popular sense is that telecommunications is a tool in search of a task.

Much emphasis has been given to the technology in the recent past. Classes and workshops in "how to telecommunicate" have been very popular. Many people have learned the basics of modem operation. Yet they still fail to use telecommunications on an ongoing, productive, wide-scale basis.

There are several reasons for this. One is the inherent complexity of most telecommunications user interfaces. Most would-be users of the technology are put off by such techno-trivia as parity, stop bits, baud, protocols, and the abstruse concepts of "upload" and "download."

Much has been made of the common problem teachers encounter in trying to convince administrators to install phone lines in close proximity to computers, if not in the computer labs. However, this problem is not as major as is commonly thought. Indeed, the idea that the teacher needs daily or frequent access to a phone line obscures the real problem with the phone line. The real problem is that the single phone line is a barrier to large-scale, effective use of the technology. Students probably type, on the average, at less than 15 or 20 baud. One phone line, used at this speed, will severely limit the numbers of students who can share an on-line experience in a given time period. Therefore, the real problem is not access to a phone line; rather, the problem is in finding ways to move student activities away from the phone line, so that a phone line is required only occasionally for batch exchanges of information.

Furthermore, successful telecommunications will occur only when educators and others come to grips not with the technology problems, but rather with the fact that a successful communications experience will occur only within the context of a carefully nurtured social situation that attends to certain critical sociological factors. It is possible to be a social isolate and be successful with a word processor, data base, or spreadsheet program. However, in a communications experience via modem, you must be part of a social structure. That is to say, there must be someone on the other end with whom you communicate. This need for collaborative interaction requires a vastly more complex, "slippery" sort of creature.

What Research Has to Say

For the past several years, Margaret Riel, Jim Levin, and other researchers at the University of California in San Diego have conducted an Intercultural Network, involving networking activities between schools here and in Alaska, Israel, Japan, Mexico, England, and other places. They have made some interesting discoveries regarding the role of networking in the academic life in the classroom.

In the Intercultural Network, networking is an extension of the writing process; that is, networking helps to meet the need to consider and define "audience." They have convincingly demonstrated that students who do meaningful writing for an actual audience write better than students who write for other purposes. They have also shown that the real-world audience, when combined with the nature of the medium itself, allows language experiences not easily available through other means. For instance, the benefits of computer-based writing include alleviating the often frustrating, if not impossible, task of deciphering handwriting. The text is easily captured, edited, and reused or published. The writing process is thus more readily integrated into the total language-learning experience, which includes speaking and reading as well as writing.

Riel has also provided some important caveats to consider when developing a school network. She found that all successful networking experiences she studied contained the following essential ingredients:

1. There is a task to be accomplished.
2. Using telecommunications to accomplish the task must be easier or more effective than other means.
3. Participants in the project know each other.
4. Participants are committed to the task.
5. There is some degree of accountability in performing the task.

CMS School-Net and the Research

These findings have guided the development of the San Diego CMS School-Net Networking Project. The purpose of this project is to improve student language and communications skills. It uses word processing to produce student writing, and it uses electronic telecommunications to provide distant audiences with whom to share that writing. As it has unfolded, the project has addressed each one of the essential criteria listed in the preceding section.

There is a task to be accomplished. Most action on CMS School-Net involves specific collaborative projects, lessons, and activities involving two or more classes. These activities are developed by the teacher-participants. They are designed to be meaningful to the students, and always involve a real-world audience. Some specific examples are described later.

Using telecommunications to accomplish the task must be easier or more effective than other means. The San Diego TEC Center has taken the lead in developing three tools to make the process of telecommunications easier for classroom teachers:

1. FrEdWriter is a public-domain word processor for the Apple computer. Students use FrEdWriter to do all of their writing activities, away from the telephone line: in their classroom, in the computer lab or library, or at home.

2. FrEdSender is a public-domain terminal program for the Apple computer. When the time comes to send student writing to the destination, the teacher uses FrEdSender to dial a FrEdSender at another school, or a local CMS School-Net bulletin board node, and sends off the student writing.

3. CMS (Computer Mail System) School-Net is a low-cost, Apple-based bulletin board system that handles the transmission of electronic mail (e-mail) and attached student files throughout the informal School-Net network. More on this later.

Participants in the project know each other. Teachers correspond extensively as a project is being developed. Efforts are made to help students learn about each other. Many initial contacts use the "pen pal" format. In many cases photos and other artifacts are exchanged. In some cases, classes become "sister classes."

Participants are committed to the task. There is some degree of accountability in performing the task. In planning a project, teachers ... timelines and make agreements. Once a project is announced to the stude... there is usually a high degree of commitment, and the students hold the teacher accountable to complete the task.

What Exactly Is CMS School-Net?

CMS School-Net is an informal, grass-roots telecommunications network. Each CMS electronic bulletin board represents a node in the network. Each node operates independently during the day as a fairly normal-looking electronic bulletin board program. However, it has two features that make it unique among electronic bulletin boards:

1. It allows you to send lengthy files of student writing to your correspondents.

2. In the middle of the night, all of the CMS nodes in the network begin to busily dial each other up and exchange e-mail. Thus, a teacher in San Diego can send a batch of student writing to a teacher in Philadelphia, or Connecticut, or Puerto Rico, or Florida, or one of 25 to 30 other places. There is no charge for this capability, and new nodes are being added each week.

CMS School-Net is not an information utility. Its primary function is to transmit student writing from one place to another, thereby opening up distant audiences for students. School-Net is more properly thought of as a writing tool, one that can be used effectively at any grade level and in any subject. The purpose of and emphasis behind CMS School-Net is to provide real audiences and real purposes to motivate writing!

For the most part, students do not correspond directly with each other. Most activities grow out of teacher-developed projects and are implemented through teacher-to-teacher contacts.

Students do all of their writing away from the modem, away from the telephone line. In a well-designed program, the phone line should be used only occasionally, to transmit a batch of student writing quickly and efficiently. It should alleviate the pressure for acquiring expensive dedicated phone lines in order to participate in a network, thus enlarging the audience of potential teacher-participants.

As with any writing tool, constructive and approprate writing will occur only within the context of a purposeful, structured writing program or project. Therefore, CMS School-Net emphasizes specific, well-planned collaborative writing activities that encourage interested, productive participation by students and teachers.

How to Get Involved in CMS School-Net

The following suggestions will help you become involved in a local CMS school-networking project:

1. Be a "writing teacher." You don't have to be an English/language arts teacher. If you teach science, social studies, or some other discipline that employs writing, you can use CMS School-Net to have your students write about your subject area. Collaborative activities can involve cultural exchanges, statistical data collection and analysis (surveys, questionnaires, demographics), science experiments and observation (astronomy, geophysics, weather and climate, pollution), and any other activity that creative minds can invent.

2. Have access to computer(s) on which your students can write (for example, Apple, IBM, or Commodore computers).

3. Have a compatible computer with a modem and a phone line available either at home or at school (lab, workroom, principal's office, and so on).

4. Have telecommunications software that supports XModem. Examples include the following: for the Apple II, ASCII Express (ProDOS® version), Point to Point, or FrEdSender; for the Macintosh, Red Ryder; for IBM-compatibles, CrossTalk.

5. Have some time ("spare" or otherwise) to learn some new concepts during the startup phases of this operation.

6. Use your telecommunications program and your modem to dial up and log onto a local CMS bulletin board and set up a new account.

7. After your account has been validated, you'll be ready to begin networking with other teachers. Begin by entering the <E>Mail section of CMS and browse through the $IDEAS section. This is similar to a public bulletin board area where projects are advertised, collaborators solicited, and activities discussed by participants throughout the network. Look for an activity here in which you can participate the first time.

8. Recruit other teachers to join you in a project. Post an "announcement" of your project in the $IDEAS section of your local CMS bulletin board. This announcement will automatically be posted on every other local board in the entire network.

9. With the help of your newfound collaborators, develop and complete the various projects in which you participate.

Examples of Projects

Many projects have been completed this past year on the San Diego CMS School-Net. Some examples:

- A book of proverbs (*refranes*) compiled in Spanish and English, involving classes in Tijuana, San Diego, Hartford (CT), and Puerto Rico

- A book of riddles compiled from students all over San Diego County

- Letters to Santa Claus, involving primary students and junior and senior high students from all over San Diego County

- A collection of "outrageous opinions" solicited from junior high school students and published in an anthology

Several classes have established "sister class" relationships, involving classes in California, Connecticut, and Puerto Rico. In-depth projects have included exchanges of photos, audio- and videotapes, and school and community memorabilia. Students have exchanged information regarding holidays, celebrations, school activities, and other subjects.

Another Example: Lincoln, Nebraska Kids' Travel Agency

During the summer of 1986, a pilot networking project took place between three San Diego Schools and the Lincoln, Nebraska, School District. The Lincoln schools set up a Kids' Travel Agency as part of their summer school program in June. They sought to collect data from all over the U.S. and put it in their data base, and then to develop information packets for people interested in taking their children on vacation to one of the places researched.

On June 16, 1986, San Diego received the following request for collaboration:

> Kid Travel, Inc. Survey, Lincoln, Nebraska, June 16, 1986
>
> We need the help of kids in your area!!! Please fill out this survey by listing the 5 or 10 "best" under each survey question. For each item you list, please give the name, address, phone, and a brief description of the item. Remember, this survey is to be filled out by "kids," not adults. We want to know kids' favorite places to eat, stay, and visit.
>
> 1. What are the "best" places to eat in your area?
>
> 2. What are the "best" places to stay (hotels, motels, campgrounds, etc.) in your area?

3. What historical attractions are there in your area?

4. What special festivals, parades, fairs, etc., happen in your area?

5. What special things are there to see, such as zoos, museums, art galleries, botanical gardens, architectural sites, etc., in your area?

6. What tours are offered in your area?

7. What amusement or state/national parks are in and around your area?

We set up a CMS node in Lincoln, which linked them up with the San Diego School-Net. An appeal was then made on the San Diego School-Net for classes in San Diego to write to Lincoln students about things to do in San Diego. Three classes responded.

After considering their audience (most of whom never have seen the ocean, or a killer whale, or Disneyland, and so on), the students eagerly described their environs to their distant correspondents. The students in San Diego were eager and motivated to write. The students in Lincoln were eager to read and edit and process the writing at that end. It was a very productive telecommunications experience.

Ordering CMS

CMS School-Net, FrEdWriter, and FrEdSender are disseminated by the Softswap Project of California Computer-Using Educators, Inc. Address mail, inquiries, and purchase orders to CUE Softswap, P.O. Box 271704, Concord, CA 94527-1704.

FrEdSender and FrEdWriter can be duplicated and disseminated freely—there are no limits on the number of copies you make. CMS, however, is not "public domain"; you may not make unlimited copies. It is provided at minimal cost and as a service to the educational community. However, you must purchase a separate CMS package for each electronic bulletin board you set up.

Hardware Requirements

The minimum hardware required to operate a CMS node includes:

—128K Apple IIe (a 64K Apple IIe or an Apple II Plus with three drives will also work; Apple IIc is not supported)

—Two 5.25-inch floppy disk drives

—One of these modems:
  a. Hayes internal Micromodem II or IIe
  b. Hayes external Smartmodem 300, 1200, or 2400 with Super Serial Card and custom RS-232 cable or cable adapter
  c. An external modem that is fully compatible with Smartmodem
  d. Novation AppleCat 300 or 1200

Note: The modem you select must support full AT Command Set, S-Register Settings, and full switch control and must support actual DCD and DTR data lines. Note that Apple modems, including Apple Personal Modems, do not provide this support, and will not work with CMS. If you purchase a modem that is not Hayes external, you should secure an agreement stating that if the modem does not work with CMS, you can exchange it for one that does. Hayes internal Smartmodem compatibles have NOT been tested with CMS, and may or may not work.

The following additional hardware is recommended:

— ProDOS-compatible clock card (times calls; allows overnight dialing of other CMS systems)

— More disk storage (for example, three or four 5.25-inch drives, a 3.5-inch 800K drive, or a hard disk)

Types of CMS Systems

NODE. Serves several local schools. Connected to a hub and perhaps other nodes. Has limited disk space. All calls are local, and 300 baud modem is adequate. Clock card is optional; can operate on an Apple II Plus or 64K Apple IIe if there are not too many users. Two disk drives provide barely minimum capacity; three drives are recommended.

HUB. Links several nodes together and serves as the local gateway to the region gate. Can also serve as a node for nearby schools. All calls are within a limited region; 128K Apple IIe with three or more drives is required; 800K disk space is recommended. Clock card is essential. Minimum 300 baud is required, and 1200 or 2400 baud is desired to handle a larger volume of intersystem e-mail.

GATE. Serves as the gateway to distant CMS School-Nets. Connected to several hubs and one or more distant gates, which may incur long distance charges. Should have a large amount of disk storage, for example, 5–10 megabytes or a RAM disk. Clock card and 1200 or 2400 baud are required.

Other Requirements

ProDOS. A knowledge of ProDOS is helpful. The CMS manual does not provide a tutorial on ProDOS and its hierarchical file structure. You should have a reference book to provide guidance along the way. Here are three good references:

- *ProDOS and Beyond*, Gary Cornell, 1985, Wiley Press.
- *BASIC Programming with ProDOS*, Apple Computer, 1984, Addison-Wesley Publishing.
- *Beneath Apple ProDOS*, Worth & Lechner, 1984, Quality Software.

COPY II Plus. You should have Copy II Plus, Version 6 or later (available from Central Point Software, 9700 Capitol Highway #100, Portland, OR 97219). This program is a lifesaver for formatting and copying disks, creating subdirectories, and so on.

TIME. The installation and troubleshooting of clocks, disks, modems, and the CMS software is fairly technical. If you do not have the technical skills required, you should find someone who does to help you set up your bulletin board system. Reading the manual, installation, and setup will take anywhere from one to three days, depending on what mistakes you make and what kinds of hardware/telephone-line problems you encounter. Once the software and hardware are properly installed, you should have little trouble operating the system yourself if you read the manual. However, there is a time commitment involved in keeping the hardware and software running and in encouraging and nurturing productive activities on the network. This time will vary depending on the volume of traffic your system handles—the more callers, the more time you will spend "sysopping." Plan on spending a minimum of two to three hours per week, however.

Editor's Update

At the time of this update, the San Diego Teacher Education Center's technology-related projects had been adversely affected by recent budg cuts in the California Department of Education.

Because of its grassroots support and its success as perceived by both participants and observers, however, CMS School-Net is in fact expandi with additional nodes being created in San Diego and Oklahoma. Althou the TEC-operated bulletin board, which represented a central hub in the network, has been discontinued, virtually all of its functions have been delegated to other nodes in the network. Moreover, various groups such San Diego State University, the Fullerton (California) School District, a CUE have agreed to contribute to the long-distance costs of the network.

As Al Rogers recently noted, "The challenge to CMS School-Net is not a technical one but rather a sociological one. The need to discover how best use the network and its sociological implications continues to be of paramount importance." Given the financial constraints, however, no formal or informal evaluation of the network and its effects is currently being planned.

Al Rogers

Al Rogers was a pioneer computer-using educator, having assembled his first microcomputer from a kit in 1976, and then teaching himself programming in a variety of computer languages. Since then he has been helping students and teachers learn how to use computers to improve basic skills and increase productivity.

In 1983 he became the computer specialist at the Teacher Education and Computer Center in San Diego, California, where he continues to coordinate the countywide training program for the use of technology in instruction. He has been a leader in the integration of technology into content instruction.

As the author of FrEdWriter and the guiding force behind the development of the related FrEdLessons, Mr. Rogers has made a significant contribution to the effective use of Apple computers in all content areas. He was featured on the cover of the January, 1987 issue of Electronic Learning Magazine *in recognition of his work on FrEdWriter.*

Mr. Rogers continues to be vitally interested in combining his technical expertise with his understanding of the problems facing teachers in the classroom. His current project, CMS School-Net, seeks to make the exciting benefits of electronic networking available to any classroom teacher. Currently, he is an independent consultant in education technology.